

- 26 -

Claims

1. Apparatus for modifying the shape of an aircraft component, the apparatus including a shaped surface so arranged that an aircraft component
5 may be forced against the shaped surface in a manner that modifies the shape of the aircraft component, wherein the shaped surface is arranged so that its shape is adjustable.
2. An apparatus according to claim 1, wherein the apparatus is arranged
10 such that the aircraft component is free to move in directions substantially parallel to the shaped surface.
3. An apparatus according to claim 2, wherein the apparatus is arranged such that, in use, the aircraft component is prevented from moving beyond
15 predefined boundaries.
4. An apparatus according to any preceding claim, wherein the apparatus includes a base which provides structural support for the shaped surface.
- 20 5. An apparatus according to any preceding claim, wherein the apparatus includes the base comprising a plurality of base modules.
6. An apparatus according to claim 5, wherein the base modules are fixed in position relative to each other during operation of the apparatus to modify the
25 shape of the aircraft component.
7. An apparatus according to claim 5 or claim 6, wherein the position of the base module relative to another base module is adjustable.
- 30 8. An apparatus according to claim 7, wherein an adjacent pair of base modules are pivotally movable relative to each other.

- 27 -

9. An apparatus according to any preceding claim, wherein the shaped surface comprises an open structure.

10. An apparatus according to claim 9, wherein the open structure comprises a
5 multiplicity of spaced apart elements and the shape to which the component may be modified is dependent on the shape defined by a notional surface that envelopes the elements.

11. An apparatus according to any preceding claim, wherein the shaped surface
10 is defined by a multiplicity of separate elements.

12. An apparatus according to claim 11, wherein the elements are arranged in groups, each group comprising a plurality of elements, the elements in each group are mounted in fixed relation to each other.

15 13. An apparatus according to any of claims 10 to 12, wherein the elements are in the form of ribs.

14. An apparatus according to any of claims 10 to 13, wherein the elements
20 are removably mounted on the apparatus.

15. An apparatus according to any of claims 10 to 13, wherein the elements are fixed in position on the apparatus by means of a portion of the element that engages with a corresponding portion of the apparatus, the portions and
25 corresponding portions being shaped such that they do not restrict movement of the elements away from the apparatus.

16. An apparatus according to any preceding claim, wherein the shaped surface is rigid.

30 17. An apparatus according to any preceding claim, wherein the apparatus is arranged such that the component is, in use, forced against the shaped surface by means of an air pressure difference.

- 28 -

18. An apparatus according to claim 17, wherein the air pressure difference is at least partially provided by suction via a bag of a bagging apparatus.

5 19. An apparatus according to any preceding claim, wherein the apparatus is in the form of a creep-forming tool.

20. An apparatus according to any preceding claim, wherein the apparatus is arranged so that it is suitable for modifying the shape of metallic components.

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21. An apparatus according to any preceding claim, wherein the apparatus further includes an intermediate member that in use receives and supports the component, is positioned between the shaped surface and the component, and deforms to a shape dependent on the shape of the shaped surface.

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22. A method of modifying the shape of an aircraft component, the method including the steps of

providing a shaped surface, the shape of which being adjustable, forcing an aircraft component against the shaped surface in a manner that modifies the shape of the aircraft component, and
20 removing the aircraft component.

23. A method according to claim 22, further including the steps of observing the modified shape of the aircraft component and comparing the modified shape
25 so observed with an ideal shape.

24. A method according to claim 23, further including the step of adjusting the shape of the shaped surface to compensate for the differences between the observed modified shape of the aircraft component and the ideal shape.

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25. A method according to claim 24, including forcing a further aircraft component against the adjusted shaped surface in a manner that modifies the shape of the aircraft component, removing the further aircraft component,

- 29 -

observing the modified shape of the further aircraft component and comparing the modified shape so observed with the ideal shape.

26. A method according to claim 23, wherein the following steps are
- 5 performed as many times as are necessary until the differences between the observed modified shape of the aircraft component and the ideal shape are within predetermined acceptable tolerances:
- adjusting the shape of the shaped surface to compensate for the differences between the observed modified shape of the aircraft component and
- 10 the ideal shape and then
- forcing a further aircraft component against the adjusted shaped surface in a manner that modifies the shape of the aircraft component,
- removing the further aircraft component,
- observing the modified shape of the further aircraft component and
- 15 comparing the modified shape so observed with the ideal shape.

27. A method according to any of claims 22 to 26, wherein the step of forcing the aircraft component against the shaped surface is performed such that the aircraft component is forced against the shaped surface, via an intermediate
- 20 member.

28. A method according to any of claims 22 to 27, wherein the step of forcing of the aircraft component against the shaped surface causes the aircraft component to undergo plastic deformation.

29. A method according to any of claims 22 to 28, wherein the method includes a step of releasing the component from the shaped surface and after the release of the component the shape of the component changes significantly.

30. A method according to any of claims 22 to 29, wherein the shaped surface is supported by a plurality of base modules, and, before the step of forcing of the aircraft component against the shaped surface, the method

- 30 -

includes a step of adjusting and fixing the position of one base module relative to another.

31. A method according to any of claims 22 to 30, wherein the shaped
5 surface is defined by a multiplicity of separate elements and, before the step of forcing of the aircraft component against the shaped surface, the method includes a step of adjusting the shape of the shaped surface by replacing one or more of the separate elements.

10 32. A method of creep forming a metallic component including using the apparatus of any of claims 1 to 21, or performing the steps of the method of any of claims 22 to 31.

33. An aircraft component formed by use of an apparatus according to any of
15 claims 1 to 21, or from performance of a method according to any of claims 22 to 31.

34. An aircraft including an aircraft component according to claim 33.